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The Trechid Beetles of the Islands of Tsushima

By

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The Islands of Tsushima, composed of two artificially separated islands and many accessory islets, lie between the Korean Peninsula and Kyushu, the westernmost main island of Japan. The distance to the former is about 50 km, and that to the latter is about 80 km with the Island of Iki in between. The principal islands extend from the north-northeast to south-southwest for about 72 km, and are nearly 700 km^2 in area as a whole. They are hilly throughout, about 400 m in altitude on an average, and rather heavily forested. Geologically, the Tsushimas are not so old, but have a complicated history. They are repeatedly included in the land bridge, which connected the Japanese Islands with the Korean Peninsula and served as a route of immigration of the mainland fauna into Japan. Even when isolated, as is the case in the present, they form an important stepping stone between the said two areas, especially for winged animals. Because of such a geological and geographical situation, the Tsushimas maintain an interesting fauna, which contains a fair number of endemic forms. Certain animals of these islands are known to have a close affinity only with Korean ones, some others are found both in the islands and in western Japan but not in Korea, and still many others are common to all the three areas.

Since the end of the last century, ground beetles of the Tsushimas have been dealt with by some authors, usually as fragmentary descriptions of new species. The true affinity of those endemic forms has not been ascertained up to the present, with the exception of a remarkable carabine (*Damaster fruhstorferi*) which is clearly of the Korean origin. On the other hand, HABU and BABA (1959) published rather a comprehensive list of the Tsushima carabids collected by the latter author, and stated that most of the species enumerated were common between the Tsushimas and northern Kyushu. Members of the subfamily Trechinae were first recorded from the islands by these authors, though they are widespread species and less useful for analyzing the faunal relationship.

The main purpose of the present report is to add a remarkable Korean element to the carabid fauna of the Tsushimas. It is an endogean anophthalmic trechine discovered by Messrs. HASEGAWA and SUGA at the southern part of the north island. So far as known to the present writer, other trechines belonging to the same genus with the endogean species occur only in several limestone caves at the central part of the Korean Peninsula. At the same time, all the trechid beetles hitherto found in the Islands of Tsushima will be enumerated, though

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our knowledge of the trechid fauna of the islands is still far from a satisfactory state.

The abbreviations used in the present paper is as follows: HW — greatest width of head; PW—greatest width of pronotum; PL — length of pronotum, measured along the mid-line; PA — width of pronotal apex; PB — width of pronotal base; EW — greatest width of elytra; EL — greatest length of elytra; M — arithmetic mean.

The writer wishes herewith to express his deep gratitude to Messrs. Masahiko HASEGAWA, Joon NAMKUNG, Yasuhiko SHIBATA and Kuniaki SUGA for their kindness in placing valuable materials at the writer's disposal for study. Hearty thanks are also due to Dr. Akinobu HABU for the privilege of re-examining the trechid specimens used by him for preparing the list of ground beetles of the Tsushima Islands.

Perileptus (s. str.) **japonicus** H. W. BATES, 1873

Perileptus japonicus H. W. BATES, 1873, Trans. ent. Soc. London, 1873, p. 296; type-locality: Hiogo.
Perileptus japonicus: YANO, 1941, Nippon no Kôchû, Tokyo, 4, p. 23.
Perileptus (s. str.) *japonicus*: JEANNEL, 1926, L'Abeille, Paris, 32, pp. 406, 414, figs. 188, 189; 1935, Rev. franç. d'Ent., 1, p. 273.
Other references are not required here.

Specimen examined. 1♀: Sago, Kamiagata-chô, at the northern part of Kami-shima (north island) of the Tsushima Islands; 1–VI–1968; collected by K. SUGA and deposited in the National Science Museum, Tokyo.

Notes. This is a widespread species recorded by JEANNEL from Japan, China, Celebes[1] and Turkestan, and by YANO from Pojodo (=Bosang-dong) in northeastern Korea. In Japan, it is common both in plains and in hilly areas throughout the main islands and also spreads over the Ryukyus. It is unknown from the Island of Iki, but may probably occur there. In Korea, the beetle is common at least in hilly areas of the central part. Its occurrence in the Islands of Tsushima is, therefore, perfectly natural, although it has not been recorded from the hilly islands up to the present.

Perileptus (s. str.) **naraensis** S. UÉNO, 1955

Perileptus (s. str.) *naraensis* S. UÉNO, 1955, Publ. Seto Mar. Biol. Lab., 4, pp. 338, 342, fig. 3; type-locality: Mt. Kasuga of Nara.
Other references are not required here.

Specimen examined. 1♂: Usseki near Sago, Kamiagata-chô, at the northern part of Kami-shima (north island) of the Tsushima Islands; 13–VI–1968; collected by Y. SHIBATA and deposited in the National Science Museum, Tokyo.

Notes. Previously known only from Honshu (as far northeast as Fukushima Prefecture) and Kyushu of the Japanese Islands. This small perileptine is usually confined in hilly areas and sporadically found in shaded places along the banks of brooks. It may occur in the Korean Peninsula, though the present writer was unable to find any place suitable for the existence of this species during his visit to the peninsular country.

1) JEANNEL's record of this species from Celebes was based on his misidentification (or rather a mistreatment) of the WALLACE's specimen (UÉNO, unpublished).

Perileptus (s. str.) **laticeps** S. UÉNO, 1955

Perileptus (s. str.) *laticeps* S. UÉNO, 1955, Publ. Seto Mar. Biol. Lab., 4, pp. 338, 340, figs. 4–6; type-locality: Inukamigawa River by Kanaya in Shiga Pref.
Perileptus laticeps: HABU & BABA, 1959, Akitu, Kyoto, 8, p. 77.
Other references are not required here.

Specimen examined. 1♀: Sumo, Mitsushima-chô, at the northern part of Shimo-shima (south island) of the Tsushima Islands; 27–V–1957; collected by K. BABA and preserved in Dr. HABU's collection.

Notes. Widely distributed in Honshu, Shikoku and Kyushu, and recorded from Tsushima by HABU and BABA. It may occur also in the Korean Peninsula, particularly at the southern part, though hitherto unknown from there.

Trechus (Epaphius) ephippiatus H. W. BATES, 1873

Trechus ephippiatus H. W. BATES, 1873, Trans. ent. Soc. London, 1873, p. 295; type-locality: Nagasaki. — HABU & BABA, 1959, Akitu, Kyoto, 8, p. 77.
Epaphius (s. str.) *ephippiatus*: JEANNEL, 1962, Rev. franç. d'Ent., 29, pp. 175, 177, figs. 1–4.
Trechus (*Epaphius*) *ephippiatus*: S. UÉNO & NAMKUNG, 1968, Bull. Nat. Sci. Mus. Tokyo, 11, p. 246.
Other references are not required here.

Specimens examined. 1♀: Izuhara, on the eastern coast of Shimo-shima (south island) of the Tsushima Islands; 22–V–1957; collected by K. BABA. 1♂: Uchiyama, at the southern part of Shimo-shima; 26–V–1957; collected by K. BABA. Both preserved in Dr. HABU's collection.

Notes. This trechine is a common, usually alate species widely distributed in the Far East. It has been recorded from both Japan and Korea (cf. UÉNO & NAMKUNG, 1968), and is also known from the Island of Iki (2 ♂♂ from Yunomoto, taken by K. BABA on May 28, 1957, and preserved in Dr. HABU's collection). Its occurrence in Tsushima was already noticed by HABU and BABA.

Coreoblemus venustus S. UÉNO, sp. nov.[2)]

Length: 2.55–2.60 mm (from apical margin of clypeus to apices of elytra).

Anophthalmic trechine of elongate body form, with fairly stout appendages; glabrous and depigmented; inner wings absent. Colour light reddish brown, shiny and translucent, though obviously darker than in the type-species of the genus, which is known from a limestone cave in the Korean Peninsula; elytra somewhat lighter than the fore-body; palpi, apical half of antennae, ventral side of hind body, and legs yellowish brown.

Head fairly large and wide, more or less depressed on the dorsal side, though both frons and supraorbital areas are moderately convex; frontal furrows entire, fairly deep though rather wide, not angulate at middle, and only gently divergent anteriad; frons with a pair of fairly long setae adjoining the frontal furrows; vertex glabrous in the female specimens examined, but provided anteriorly with four, irregularly ranged hairs in the holotype; in the

2) The description of the new genus *Coreoblemus* will be given at the end of this paper.

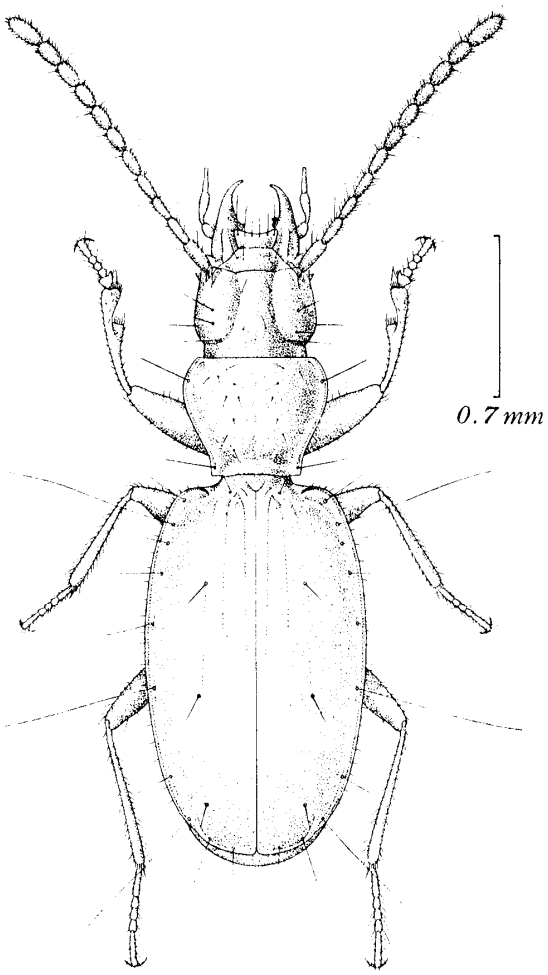

Fig. 1. *Coreoblemus venustus* S. UÉNO, sp. nov., ♂, of Nuka-daké Hills in the Islands of Tsushima.

females, only two supraorbital setae present on each side as usual, but in the holotype, the supraorbital series is supplemented on each side by a smaller seta inserted between the normal two pores; eyes wanting; genae swollen, widest at a level close to neck constriction, perfectly glabrous, though provided with a conspicuous temporal seta on each side at the widest part; neck wide, with neck constriction deep at the lateral sides; microsculpture distinct, consisting of polygonal meshes; labrum transverse, moderately emarginate at apex; mandibles relatively stout, though sharply hooked at apices; mentum seemingly free, with distinct labial suture; mentum tooth prominent, simple and acute at the tip; submentum with a transverse row of eight or nine setae; palpi fairly stout, with penultimate segments tumid at the apical parts; apical palpal segments thin; antennae relatively short and stout, submoniliform at the apical half, barely reaching basal one-fourth of elytra in ♂, still shorter (though slightly) than that in ♀; antennal segment 2 as long as segment 3 and slightly longer than segment 4; each one of antennal segments 7–10 oval and about twice as long as wide.

Pronotum cordate, widest at about seven-tenths from base, and strongly contracted basad;

PW/HW 1.17–1.19 (M 1.18), PW/PL 1.24–1.27 (M 1.25), PW/PA 1.27–1.30 (M 1.28), PW/PB 1.67–1.71 (M 1.69); disk well convex and provided on each side with a series of usually seven dorsal setae, which are ranged on an outwardly curving line, starting from just inside front angle, running inwards along apical margin and then posteriad along median line; in the holotype, three additional setae present on the left side exterior to the normal dorsal series, making the arrangement of dorsal setae very irregular; microsculpture very slight and evanescent on the greater part of disk, though consisting of rather coarse, polygonal meshes; in basal area, microsculpture sharply impressed, consisting of fine, more or less wide meshes; sides narrowly bordered throughout, rather strongly but not so widely rounded in front, distinctly but rather shallowly sinuate at about one-sixth from base, and slightly convergent posteriad behind the sinuation, with both lateral and postangular setae, the latter of which is a little distant from the angle; side border faintly indented around the ante-basal sinuation; apex nearly straight or very slightly emarginate at middle, much wider than base, which is nearly straight at middle and slightly emarginate on each side just inside hind angle, PA/PB 1.29–1.35 (M 1.32); front angles narrowly rounded and only slightly advanced; hind angles either rectangular or sharp, more or less produced posteriad but not laterad; median line distinctly impressed on the disk, but reaching neither apex nor base; apical transverse impression slight, either vaguely wrinkled or nearly smooth; basal transverse impression fairly wide and deep, more or less uneven though almost continuous, and merging on each side into small basal fovea, which is moderately deep and alutaceous at the bottom; no postangular carinae.

Elytra oblong-oval, widest at about middle, and well convex though more or less depressed on the disk; EW/PW 1.42–1.51 (M 1.47), EL/EW 1.58–1.66 (M 1.62); shoulders conspicuous, nearly square though rounded, with prehumeral borders almost perpendicular to the mid-line; humeral areas narrowly and rather feebly explanate; sides narrowly bordered throughout and rather closely ciliated, feebly rounded from behind shoulders to the level of the seventh pore of the marginal umbilicate series, and then moderately rounded to suture, with preapical emargination usually distinct; apices rounded, having a small but distinct re-entrant angle at the suture; striae very superficial and mal-defined, stria 1 moderately impressed in basal half or two-thirds but disappearing towards apex, 2 and 3 usually perceptible on the disk and deepening at the base, 4 and 8 rarely visible as slight fragments, others virtually evanescent; scutellar striole vestigial even if perceptible; apical striole distinct, moderately curved, and slightly bent outwards at the anterior end, which is free; intervals very slightly convex near suture; apical carina distinct though obtuse; two setiferous dorsal pores present on or on the site of stria 3 at about one-fourth and five-ninths from base respectively; preapical pore situated at a position about equally distant from apex and from suture, and very close to the anterior end of apical striole; the humeral group of umbilicate pores nearly adjoining marginal gutter though not aggregated, the first and fourth pores more or less isolated from the second and third, the distance between the first and second pores being a little larger than that between the second and third, though usually smaller than that between the third and fourth; the two pores of the middle group are very widely spaced, the fifth pore being always closer to the fourth than to the sixth; microsculpture composed of coarse polygonal meshes, though very superficial and partially dissolved into irregular lines.

Ventral surface glabrous and smooth; anal sternite with a pair of sexual setae in ♂, two pairs of the setae in ♀. Legs relatively short and stout for a member of the genus; protibiae slightly bowed, gently dilated towards apices, and not externally grooved; in ♂, only a single proximal segment of each protarsus dilated, inwardly produced at apex and furnished beneath with sexual adhesive appendages, the second protarsal segment being absolutely simple as in ♀; metatarsal segment 1 shorter than segments 2–4 together, though evidently longer than segments 2–3 together.

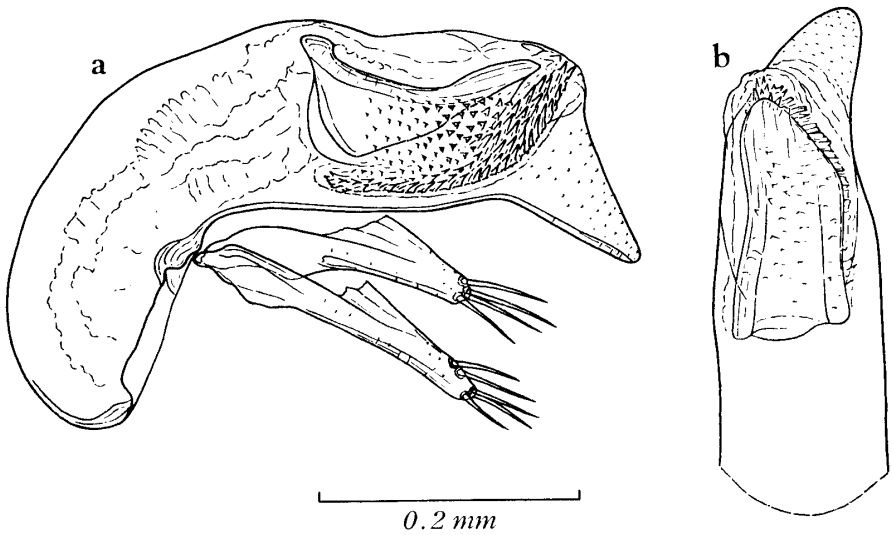

Fig. 2. Male genital organ of *Coreoblemus venustus* S. UÉNO, sp. nov., of Nuka-daké Hills in the Islands of Tsushima; left lateral view (a), and dorsal view of the apical part of aedeagus (b).

Male genital organ very small and rather poorly sclerotized. Aedeagus three-tenths as long as elytra, short, robust and not arcuate at middle; basal part large, elongate and rather abruptly bent towards the ventral side, with large basal orifice, of which the lateral sides are not emarginate; sagittal aileron absent; viewed laterally, apical part forms a triangular lobe obliquely projecting ventrad, with the tip narrowly rounded; viewed dorsally, apical lobe broad, obviously bent to the left, and rounded at apex; ventral side slightly convex behind middle but deeply concave before the apical lobe. Inner sac armed with a large copulatory piece and a sheet of large teeth; copulatory piece saddle-shaped though asymmetric, with the left lobe smaller than the right; the sheet of large teeth lies at the ventral side of inner sac and envelops the lower parts of copulatory piece. Styles rather small and narrow, left style obviously longer than the right; in the holotype, the right style is provided with four setae at apex as usual, while the left bears five setae, of which three are inserted at apex but the other two are ranged on the dorsal margin.

Type-series. Holotype: ♂ (Nuka-daké Hills, 2-IV-1964, collected by M. HASEGAWA). Allotype: ♀ (Eboshi-daké Hills, 1-IV-1964, by K. SUGA). Paratype: 1♀ (Eboshi-daké Hills, 1-IV-1964, by M. HASEGAWA). All deposited in the National Science Museum, Tokyo.

Localities. Nuka-daké Hills, in Nukadaké of Toyotama-son (type-locality!), and Eboshi-daké Hills, in Nii of Toyotama-son, both near the southwestern end of Kami-shima (north island) of the Tsushima Islands.

Notes. Among the Japanese trechines, the present new species is very exceptional in that the male protarsus has only a single modified segment. This character is usually regarded as generic (e.g., *Sporades*, *Neotrechus*, *Orotrechus*, *Kosswigia*, *Nannotrechus*, etc.) or subgeneric (e.g., *Microtrechus*), and in the case of the *Neotrechus* complex, it is currently adopted as a key character of the phyletic series. However, it seems futile to erect a new taxon for the Tsushima species based solely upon this feature, since the beetle is otherwise closely similar to the type-species of *Coreoblemus*. As was reported elsewhere (UÉNO, 1969, pp. 487, 489), the dilatation of male protarsi is considerably variable among the members of the genus *Stygiotrechus*, the closest relative of *Coreoblemus*, and in an exceptional case (*S. esakii* S. UÉNO), the protarsi are perfectly simple even in the male. These evidences seem to indicate that the secondary sexual character is not stable in the primitive trechines belonging to *Stygiotrechus* and its allies. In these archaic genera, therefore, the difference in the protarsal modification may have no more than a specific value.

The Nuka-daké hills, the type-locality of this remarkable new trechine, lie on the north side of Niiasô Cove. They are less than 200 m in altitude but are largely covered with evergreen broad-leaved forests. The type-specimen was found under a heap of rather flat stones overlying wet ground in a shallow sloping depression. The spot was near the head of a glen (about 100 m above sea-level) at the back of the village of Nuka. The other known locality of the present species is near the north end of the Eboshi-daké hills that extend at the opposite side of Niiasô Cove from the Nuka-daké hills, and is about 1,700 m distant to the southeast from the type-locality. It has an environment very similar to that of the type habitat, though it is located in a deciduous broad-leaved forest. The beetles were taken from under a heap of rubble near the source of a glen at the altitude of about 100 m.

Zoogeographic Notes

As was already stated before, the trechid fauna of the Tsushimas does not seem to be satisfactorily known. This is easily understood from the fact that all the trechids recorded in this paper have been known only by a very small number of specimens. Even ripicolous forms like perileptines have not been collected adequately. It is possible that the islands are inhabited by certain apterous species of humicolous trechines, which may have some zoogeographic significance. At present, however, we are only aware of two prominent features of the trechid fauna of the islands.

One of these features is the predominance of winged widespread forms in the Tsushimas. Four out of the five trechid species hitherto known from the islands, three perileptines and a trechine, have large eyes and fully developed wings, and can fly well. The perileptines are particularly good fliers and readily take wing when disturbed. *Trechus ephippiatus* is less agile as it is primarily humicolous in nature, but frequently flies to light at night. It is natural that these active species are much more widely distributed than wingless, highly specialized ones and have better chance to reach isolated islands. Such narrow straits as are on both sides

of the Tsushimas do not appear to have formed effective barriers for their dispersal. Even so, the number of alate species is considerably large in the Tsushimas, as it amounts to fifty per cent of all the alate forms of the Japanese trechids.

All the four species with fully developed hind wings are widely distributed in western Japan, and two of them (*Perileptus japonicus* and *Trechus ephippiatus*) are actually known from Korea as well. The remaining two, both perileptines, have not been found in Korea up to now, but may occur there. At any rate, these perileptines may have invaded Tsushima from western Japan, which was reached by their ancestors through the Ryukyus. It is more difficult to determine the route of immigration of *P. japonicus,* which is common both in Japan and in Korea and spreads along the Chinese coast at least as far north as the Shantung Peninsula. The beetle may have been able to reach Tsushima from whichever side of the straits, but the southern route (via western Japan) seems more probable in view of the main direction of the summer wind. It is not necessary to assign the dispersal of such a minute winged insect to land bridges, as was done by JEANNEL (1942, p. 268), although the actual immigration might have been made through one of them.

Contrary to the case of these ripicolous trechids, all of which seem to have arisen in warmer parts of the Far East, *Trechus ephippiatus* doubtless originated in the northern part of the Asian Continent and immigrated into western Japan through Korea and Tsushima. From the geological data available at present, it is almost impossible to decide when and how such an immigration was performed. It may have taken place any time during the Neocene and the Pleistocene, irrespective of the condition of land between Korea and western Japan. In any case, the existing straits between these two areas have been crossed somehow by the trechine. The Tsushimas that lie on the route from Korea to Kyushu must have played a major rôle as an intermediary place in such a southward dispersal. The existing Tsushima population of this trechine may possibly be recent, though there is no way to estimate the approximate length of its history.

The second prominent feature of the trechid fauna of the Tsushimas is the existence of an unmistakable Korean element. This type is represented by *Coreoblemus venustus,* a small endogean species whose congeners have been found only in a few limestone caves of central Korea. The genus *Coreoblemus* is a small group of primitive trechines mainly characterized by the aberrant chaetotaxy of different parts of body. Its closest relative seems to be the genus *Stygiotrechus,* whose members occur sporadically along the inner belt massifs of western Japan. All the known species of these two genera are eyeless, wingless and colourless, showing that they have undergone a high degree of subterranean specialization. Both the genera are no doubt very old, and though probably derived from a common ancestral stock, they have been separated so long as to evolve into two distinctive groups. Most interesting and important is that the Tsushima Straits have constituted so effective a barrier against the dispersal of these trechines, but that the ancestor of *C. venustus* could invade Tsushima across the Korea Straits. This means that the beetles have long since lost the ability to cross a certain stretch of water, probably since the Miocene when the Tsushimas were included in the Korean Land but were separated from western Japan by the ancient Tsushima Straits. At all events, *C. venustus* seems to be a relict form, having survived in the Islands of

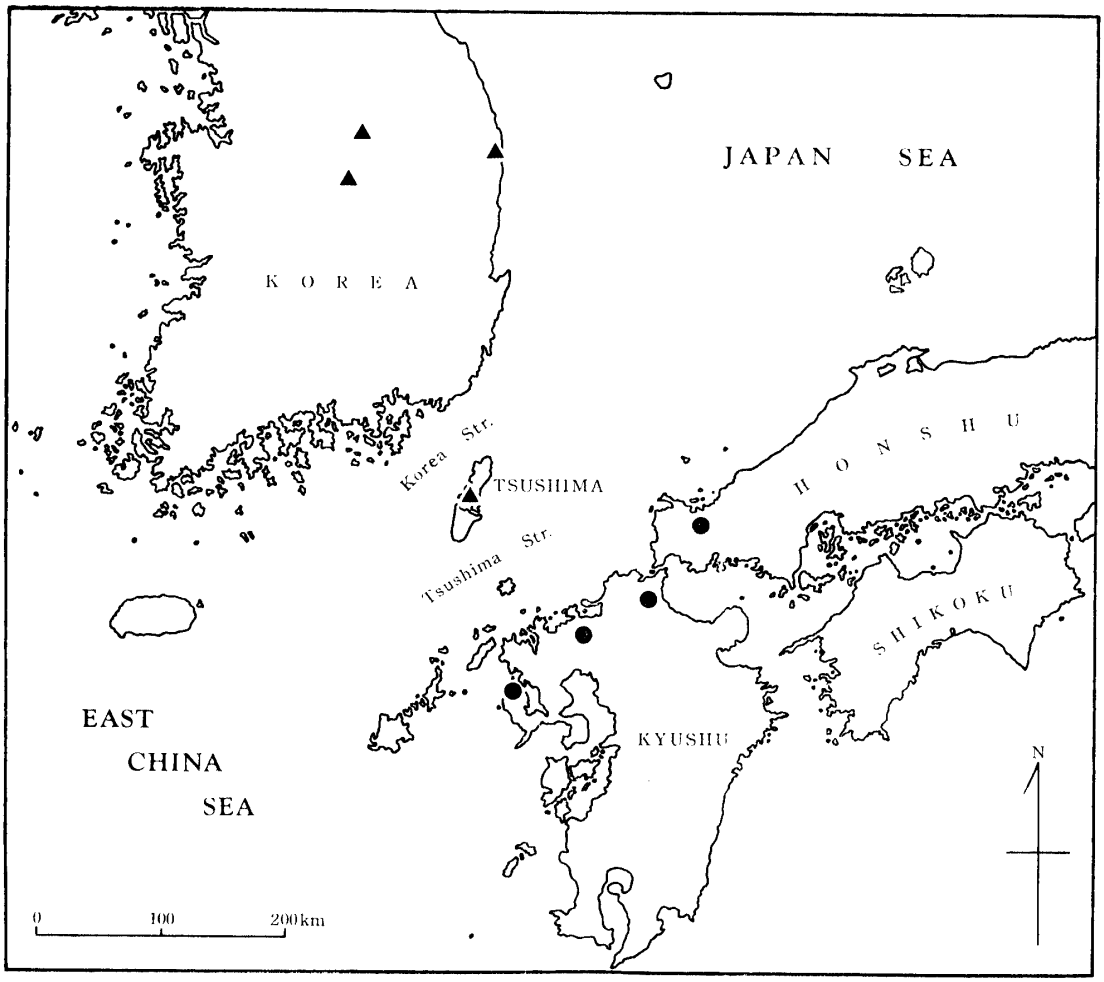

Fig. 3. Map showing the known localities of *Coreoblemus* (triangles) and those of the cave species of *Stygiotrechus* (circles).

Tsushima since the preglacial period.

In short, the trechid beetles of the Tsushimas may be distinguished into two groups of different relationship. One of them contains winged widespread species, which may be of more or less recent origin. Four out of the five species hitherto known from the islands fall under this category, although three of the four, all perileptines, seem to have come from western Japan and the remaining one, a humicolous trechine, has doubtless immigrated from the Korean Peninsula. The other group is represented only by a single endogean species, which is endemic to the islands but is definitely of the Korean origin and has no congeners in western Japan. This anophthalmic trechine seems to be much older than the winged forms and to have survived in the islands as a relict of the preglacial period.

Appendix

As the Tsushima species of *Coreoblemus* does not seem to be a legitimate one in view of the peculiar modification of its male protarsi, the writer prefers to select one of the Korean species as the type of the new genus. The descriptions of these new taxa will be given below.

Genus **Coreoblemus** S. UÉNO, nov.

Type-species: *Coreoblemus parvicollis* S. UÉNO, sp. nov.

Small anophthalmic trechines belonging to the *Trechoblemus* complex and related to *Stygiotrechus* of western Japan. Readily distinguished from the latter by the glabrous surface of body, the peculiar chaetotaxy of head and pronotum, and the unusual position of the fifth pore of the marginal umbilicate series.

Head more or less wide, with deep and entire frontal furrows; eyes wanting; genae well convex and perfectly glabrous; neck wide; chaetotaxy unusual, normally composed of a pair of frontal, two pairs of supraorbital and a pair of temporal setae, though rarely supplemented by a pair of extra supraorbital ones; the frontal setae probably correspond to the suprafrontal ones found in *Stygiotrechus*; vertex usually glabrous, but rarely with a few hairs; labium seemingly articulated, with a distinct suture between mentum and submentum, the former with a large simple tooth in the apical emargination and the latter with a transverse row of eight to ten setae; antennae more or less slender, though becoming submoniliform towards apices in *C. venustus*; all the other cephalic features as in *Stygiotrechus*.

Pronotum cordate, obviously contracted basad, with the sides well rounded in front and more or less distinctly sinuate before hind angles, which are either rectangular or a little sharp; side borders bare, neither ciliated nor clearly indented; both lateral and postangular setae present, the latter being a little distant from the angle; basal transverse impression deep and continuous in the Korean species but more or less uneven in the Tsushima one; disk usually with five to seven dorsal setae on each side, which are ranged on an outwardly curving line. Scutellum distinct.

Elytra fairly large, with distinct shoulders and rounded apices; sides narrowly bordered and ciliated throughout, though neither serrate nor denticulate at the humeral part; striae very superficial, always obliterated at the sides and near apices, and sometimes also on the disk; scutellar striole indistinct; apical striole distinct though short, free at the anterior end; two setiferous dorsal pores present on or on the site of stria 3, preapical pore located near the anterior end of apical striole; humeral group of umbilicate pores not perfectly aggregated, the first pore adjoining prehumeral border and the fourth being more or less distant from the other three; middle group of umbilicate pores widely spaced, the fifth pore always isolated and sometimes closer to the fourth than to the sixth.

Ventral surface glabrous; anal sternite provided with a pair of sexual setae in ♂, with two pairs of the setae in ♀. Legs more or less slender though shorter and stouter in the endogean species than in the cavernicolous ones; protibiae entirely pubescent and without groove on the external face; in ♂, two proximal segments of each protarsus distinctly dilated and spurred inwards at apices in the Korean forms, but in the Tsushima species, the second segment is absolutely simple as in ♀.

Male genital organ small. Aedeagus more or less short and robust, with projecting apical lobe which is rounded at the extremity; sagittal aileron either present or absent; inner sac armed with a large copulatory piece which is longitudinally rolled with the concave face below; a sheet of large teeth is present in the Tsushima species, while the surface of copulatory

piece is covered with minute scales in the Korean species. Styles usual, left style being longer than the right; the number of apical setae varies from two to five.

Range. South Korea and the Islands of Tsushima.

Notes. It seems doubtless that the present new genus is directly related with *Stygiotrechus*. The known members of these two genera are considerably different in facies, but they have many important characters in common. Both have articulated mentum, irregularly arranged pores of the humeral umbilicate series, and entirely pubescent protibiae. The peculiar frontal setae of *Coreoblemus* are found in *Stygiotrechus* as a pair of suprafrontal ones, and the remarkable dorsal series of setae on the pronotum of the former are represented by two or three pairs of dorsal setae in the latter. The fundamental structure of male genitalia is also common between the two. *Coreoblemus* could be regarded as a subgenus of *Stygiotrechus*, were it not for the marked difference in the chaetotaxy. As it is, the two groups are treated in this paper as closely related but independent genera.

Besides the two species described in the present report, members of this new genus have been found in Seongryu-gul and Hogye-hangtigi-gul Caves at the central part of Korea (cf. UÉNO *et al.*, 1966, pp. 467, 485–486). These forms will be fully dealt with in the Results of the Speleological Survey in South Korea 1966.

Coreoblemus parvicollis S. UÉNO, sp. nov.

Length: 2.45–2.55 mm (from apical margin of clypeus to apices of elytra).

Relatively small anophthalmic trechine, with small fore-body and broad elytra; apterous and depigmented; integument glabrous on both the dorsal and ventral surfaces. Colour pale reddish brown, shiny and translucent; palpi, antennae, ventral side of hind body, and legs pale yellowish brown.

Head fairly short and broad, with frontal furrows very deep, entire, not angulate at middle, and rather poorly divergent anteriad; both frons and supraorbital areas moderately convex, the former bearing a pair of frontal setae which adjoin the frontal furrows; vertex devoid of hairs; supraorbital pores two in number; microsculpture composed of coarse polygonal meshes, but very superficial and partially degenerated; eyes absent; genae swollen, widest at a level a short way before neck constriction, perfectly glabrous, though bearing a pair of remarkable temporal setae at the widest part; neck wide; neck constriction deep at the lateral sides; labrum transverse, shallowly but evenly emarginate at apex; mandibles fairly slender and sharply hooked at apices; labium imperfectly fused, having a clear suture between mentum and submentum; mentum tooth well produced and acute; submentum with a transverse row of eight or nine setae; palpi rather short, with penultimate segments tumid at the apical parts and surmounted by long subulate apical segments; antennae subfiliform and fairly slender, reaching basal two-fifths of elytra in ♂, slightly shorter than that in ♀, with segment 2 about as long as segment 4 and slightly shorter than segment 3; each one of antennal segments 7–10 oblong-oval and a little more than twice as long as wide.

Pronotum transverse cordate, widest at about seven-tenths from base, and contracted basad; PW/HW 1.18–1.21 (M 1.20), PW/PL 1.28–1.31 (M 1.30), PW/PA 1.27–1.33 (M 1.31), PW/PB 1.53–1.56 (M 1.55); disk moderately convex and provided on each side with a series

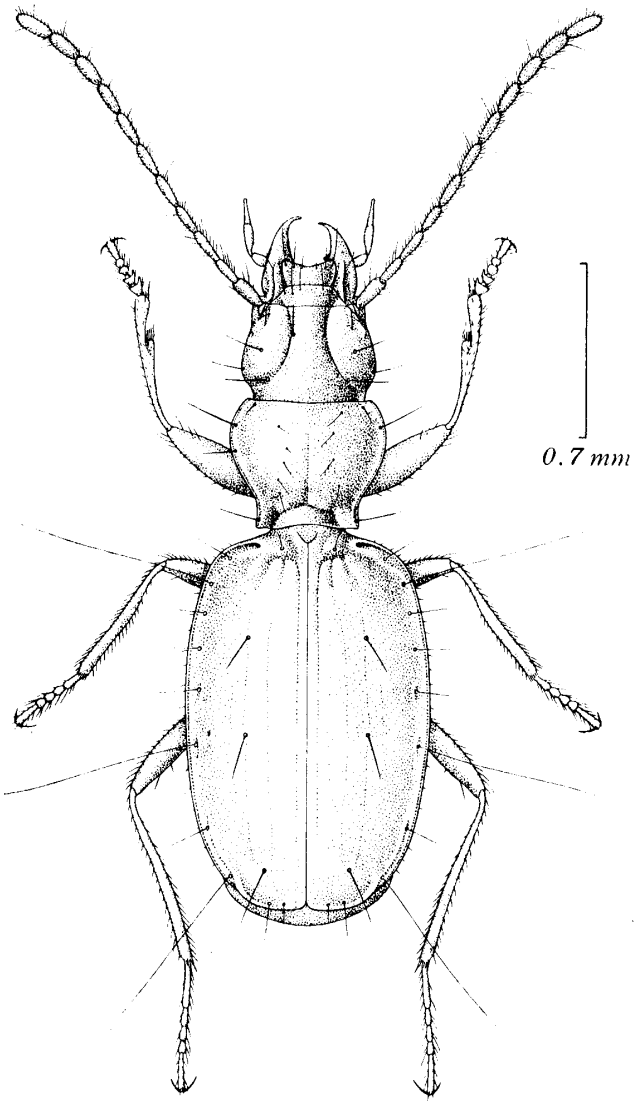

Fig. 4. *Coreoblemus parvicollis* S. UÉNO, sp. nov., ♂, of Cheongpung-pung-hyeol Cave in South Korea.

of five or six dorsal setae, which are ranged on an outwardly curving line and of which the anteriormost one is situated just inside front angle; microsculpture composed of polygonal meshes, though very slight and largely evanescent except for the basal area; sides narrowly bordered but sharply reflexed throughout, widely and rather strongly rounded in front, deeply sinuate at about one-fifth from base, and nearly parallel at the basal part; both lateral and postangular setae present, the latter being slightly before the angle; in the paratype, an additional smaller marginal seta present behind the left lateral seta; apex nearly straight or slightly emarginate, obviously wider than base, PA/PB 1.18–1.21 (M 1.19); front angles narrowly rounded and hardly advanced; hind angles small and sharp, more or less produced backwards but not outwards; base nearly straight at middle, with a small but distinct emargination on each side just inside hind angle; median line deeply impressed on the disk

between the two transverse impressions, but not extending beyond the basal one of them nor reaching apex; apical transverse impression vague, somewhat wrinkled; basal transverse impression deep, continuous and smooth, merging on each side into basal fovea, which is small but deep and smooth at the bottom; basal area covered with deeply impressed, more or less wide meshes of microsculpture; postangular carinae absent.

Elytra subovate and moderately convex, widest at about middle and with ample basal part; EW/PW 1.50–1.55 (M 1.52), EL/EW 1.47–1.50 (M 1.49); shoulders prominent though rounded, humeral areas narrowly but distinctly explanate; prehumeral borders a little oblique and nearly straight; sides narrowly bordered throughout and rather closely ciliated, feebly rounded from behind shoulders to the level of the seventh pore of the marginal umbilicate series, and then moderately rounded to suture without distinct emargination; apex of each elytron rounded, forming a small re-entrant angle at the suture; striae shallow, impunctate and not sharply defined, 1 nearly entire though becoming obsolete near apex, 2 and 3 more or less distinct on the disk and somewhat deepening at the base, 4 fragmentary but usually traceable, 5 sometimes perceptible as a trace, 6 and 7 evanescent, 8 visible only around the umbilicate pores of the marginal series; scutellar striole indistinct; apical striole distinct though short and not sharply impressed, free at the anterior end and directed to the site of stria 5; intervals very slightly convex near suture; apical carina distinct though obtuse; stria 3 with two setiferous dorsal pores situated at about one-fourth from base and about middle; preapical pore situated at the meeting point of striae 2 and 3, fairly close to apex (equally distant from apex and from suture), and evidently closer to apical striole than to suture; the proximal three pores of the marginal umbilicate series ranged almost equidistantly, but the fourth pore is always isolated, the distance between the third and fourth pores being evidently larger than that between the second and third, the first pore adjoining prehumeral border; the two pores of the middle group are widely spaced, the distance between them being distinctly larger than that between the third and fourth, and the distance between the fourth and fifth pores is usually smaller than that between the second and fourth; microsculpture distinct though superficial, consisting of more or less wide, irregularly polygonal meshes.

Ventral surface glabrous and smooth; anal sternite with a pair of sexual setae in ♂, with two pairs of the setae in ♀. Legs slender; protibiae nearly straight and not externally grooved; in ♂, two proximal segments of each protarsus distinctly dilated, inwardly spurred at apices and furnished beneath with sexual adhesive appendages; metatarsal segment 1 about as long as or slightly longer than segments 2–4 together.

Male genital organ very small though moderately sclerotized. Aedeagus about three-tenths as long as elytra, short and robust, but more or less arcuate, with basal part gently bent ventrad; basal orifice fairly large, with the lateral sides hardly emarginate; sagittal aileron distinct though not particularly large; viewed laterally, apical lobe rather short, straightly produced and narrowly rounded at the extremity; viewed dorsally, apical lobe fairly narrow, nearly parallel-sided, inclined to the left and rounded at the extremity; ventral side more or less distinctly concave at middle but nearly straight before apex. Inner sac armed with a large copulatory piece, which is spatulate, concave on the ventral side, and wholly covered with scales; viewed dorsally, copulatory piece elongate subtrapezoidal, gradually narrowed towards

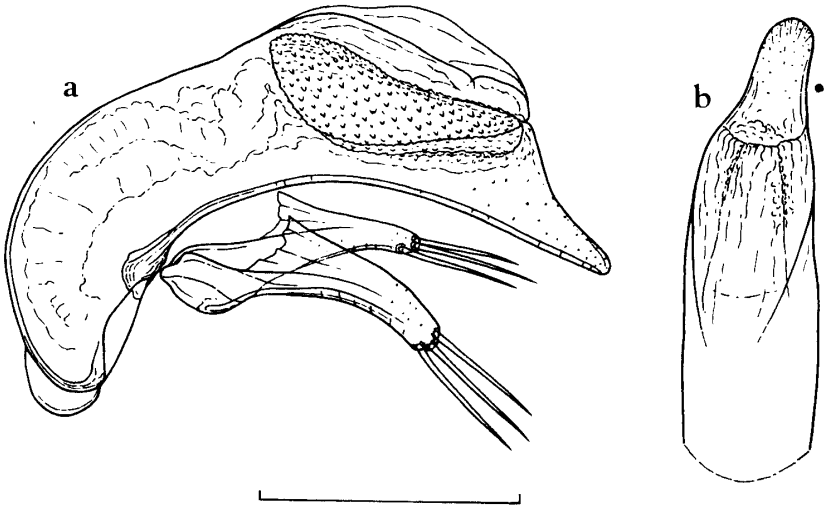

Fig. 5. Male genital organ of *Coreoblemus parvicollis* S. UÉNO, sp. nov., of Cheongpung-pung-hyeol Cave in South Korea; left lateral view (a), and dorsal view of the apical part of aedeagus (b).

apex. Styles relatively short, left style obviously larger than the right, each provided with three long setae at apex; in the paratype, only two apical setae are present on the left style, though there are three apical setae on the right.

Type-series. Holotype: ♂, allotype: ♀, paratype: 1 ♂ (26–VIII–1967, collected by J. NAMKUNG and deposited in the National Science Museum, Tokyo).

Type-locality. Limestone cave called "Cheongpung-pung-hyeol", at Bukjin-ri of Cheongpung-myeon, in Jecheon-gun, Chungcheong-puk-do, South Korea.

Notes. The limestone cave "Cheongpung-pung-hyeol" lies on the right side of the Han-kang River. The entrance, 1 m wide and 50 cm high, opens about 20 m above the water of the river, and leads into an entrance room, about 2 m wide and 10 m long. According to Mr. NAMKUNG, trechines were found at the inner end of this elongate room, from under cobbles near a small pool fed by trickling water. A narrow passage leads off at the left side of the entrance room, continues for more than 200 m, and divides into several branches on the upper level. The floor is wet and largely clayey in these parts of the cave. Troglobiontic animals are, however, extremely scarce at the depth, and no trechines have been taken in these upper passages.

Summary

Up to the present, five species of trechid beetles have been found in the Islands of Tsushima lying between the Korean Peninsula and the Island of Kyushu, western Japan. They are classified into three different genera, *Perileptus*, *Trechus* and *Coreoblemus* (new genus). The first-named genus comprises three species, *P. japonicus*, *P. laticeps* and *P. naraensis*, all of which have large eyes and well developed hind wings. These species are no doubt of the southern origin and seem to have immigrated into Tsushima from western Japan, where they are widespread.

The other two genera contain a single species each, that is, *Trechus ephippiatus* and *Coreoblemus venustus* (new species). The former is an oculate and alate species widely distributed in the northern part of the Asian Continent and in the Japanese Islands. Its dispersal must have taken place towards the south and east from the Asian mainland, and the Tsushimas must have served at least as a stepping stone from the Korean Peninsula to western Japan. On the other hand, the latter is apterous, anophthalmic and depigmented, being confined in certain endogean habitats at the heads of glens. Its congeners have hitherto been found only in South Korea, and are highly adapted to subterranean existence. As it has successfully invaded Tsushima but has not crossed the Tsushima Straits, *Coreoblemus* may be a remnant of an old fauna that existed in the ancient Korean Land, and has probably survived since the preglacial period.

The new genus *Coreoblemus* belongs to the *Trechoblemus* complex and seems to be closely allied to *Stygiotrechus* of western Japan. It is, however, easily distinguished from the latter by the glabrous integument and the aberrant chaetotaxy of various parts of body. Since the Tsushima species seems to be a peculiarly modified offshoot, one of the Korean species is selected as the type of this genus and is described under the name *C. parvicollis* at the end of this paper.

要　　約

対馬からこれまでに見つかったチビゴミムシ亜科の甲虫類は5種ある．そのうちの2種は，土生と馬場 (1959, p. 77) によってすでに記録されているが，残りの3種はこの論文で新たに報告するものである．これら5種のチビゴミムシ類のうち，4種までが大きい複眼とよく発達した後翅をもち，対馬以外の地域にも広く分布している．最後の1種は地中性で，複眼も後翅も体の色素もなく，明らかに対馬固有の種と考えられる．

有翅の4種のうちの3種はホソチビゴミムシ属に含まれるもので，それぞれホソチビゴミムシ *Perileptus japonicus* H. W. Bates, オオホソチビゴミムシ *P. laticeps* S. Uéno およびツヤホソチビゴミムシ *P. naraensis* S. Uéno と呼ばれる．最初の種は，日本と朝鮮半島を含むアジア東部に広く分布しているが，北部地域への拡散は比較的最近に行なわれたものらしい．また，あとの2種は，今のところ日本列島以外から知られていないが，朝鮮半島にも分布している可能性がある．いずれにしても，これらの種のすべてが，おそらく西日本から対馬へ侵入したものであろう．

ホソチビゴミムシ類は，ほとんどつねに流水の近くにすみ，生息場所が乱されたり危険が迫ったような場合にはすぐ飛び立つし，灯火に集まってくる性質もある．体が微小でしかも活動的な昆虫にとっては風が拡散の動因になり得るので，対馬海峡や朝鮮海峡のような狭い水域が，ホソチビゴミムシ類の拡散に対する決定的な障害になったとはまず考えられない．上記の3種も，新第三紀以降のどの時期にでも対馬へ侵入し得たであろうが，実際に定着が行なわれたのは案外新しい時代のことなのではなかろうか．

有翅の他の1種ヒラタキイロチビゴミムシ *Trechus ephippiatus* H. W. Bates は，シナからシベリアにかけて広い分布域をもち，西日本へは朝鮮半島を経て侵入したものと考えられる．したがって，分布域の広い有翅の種であるとはいうものの，その由来はホソチビゴミムシ類の場合とかなり異なっている．対馬への定着がいつどうして行なわれたかを知る手掛りは少なく，しかも信頼性に乏しい．しかし，ヒラタキイロチビゴミムシのような甲虫の移動に陸橋が不可欠であろうとは必ずしも考えられないので，現存の対馬産の個体群はそれほど歴史の古くないものかも知れない．

以上の有翅種に比べると，盲目で地中性のチビゴミムシは，より古い時代から対馬にすみついてきたものらしい．この種は，アトスジチビゴミムシ群に属する新種で，西日本の内帯に分布するノコメメクラチビゴ

ミムシ属 *Stygiotrechus* S. UÉNO と類縁の近いものである．しかし，体表をおおう細毛がなく，前頭部と頬部とにそれぞれ1対ずつの剛毛があり，前胸背両側の背面剛毛列が弧状に並んだ多数の剛毛から成り，また上翅側縁部の第5丘孔点が前方へ移動して第6丘孔点から遠く離れているので，これを西日本の種と同じ属に含めるには無理がある．そこで，この種と，同じ系列に属すると考えられる韓国産の洞窟性チビゴミムシ類とに対して，チョウセンメクラチビゴミムシ属 *Coreoblemus* S. UÉNO という新しい属を立て，前者をツシマメクラチビゴミムシ *Coreoblemus venustus* S. UÉNO と命名した．チョウセンメクラチビゴミムシ属とノコメメクラチビゴミムシ属とは，同じ属群のうちでも比較的原始的な地位を占め，分布の様子も散発的，遺存的である．しかも，これら2属の分布域が対馬海峡によって明確に区分されている点を合わせ考えると，ツシマメクラチビゴミムシの祖先が対馬に定着した時期はかなり古く，対馬を含む朝鮮陸塊と西日本とが古対馬水道によって隔てられていた時代，おそらくは第三紀の中新世にまで遡るのではないかと推察される．

なお，この対馬産の地中種は，朝鮮半島の石灰洞にすむ同属の種に比べて，かなり特異な分化を遂げている．とくに，前跗節における雄の第二次性徴が基節だけにしか現われていない点は，一般に属や亜属の標徴として用いられるほどチビゴミムシ類に例の少ない形質である．それで，新属の模式種には，より普遍的な特徴をそなえた韓国産の種の一つを選び，その記載を属の記載に合わせて論文末につけた．属模式種 (*Coreoblemus parvicollis* S. UÉNO) の産地は，韓国忠清北道堤川郡清風面北津里の清風風穴，模式組標本は南宮 煥氏によって採集されたものである．

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